Claims

[c1] A method for selectively altering dielectric properties of a semiconductor device, the method comprising: applying energy to a local region of interest, said local region of interest including a thermally alterable dielectric such that said heating caused by said applied energy causes a dielectric constant of said thermally alterable dielectric to change.

[c2] The method of claim 1, wherein said thermally alterable dielectric further comprises a porogen material.

[c3] The method of claim 2, wherein said dielectric constant is decreases when said porogen material is heated by said applied energy.

[c4] The method of claim 3, wherein said applied energy comprises at least one of: electric current and an optical beam.

[c5] The method of claim 1, further comprising applying said energy to an interconnect structure surrounding said local region of interest, wherein heat energy generated within said interconnect structure is transferred to said thermally alterable dielectric.

[c6] The method of claim 1, wherein the semiconductor device is provided with packaging material transparent to optical radiation and said applied energy comprises an optical beam applied directly to said thermally alterable dielectric in said local region of interest.

[c7] A method for selectively altering the dielectric constant of dielectric material within a semiconductor device, the method comprising:
selecting the dielectric material to be a thermally alterable dielectric material within a local region of interest;
forming an interconnect structure around said local region of interest, said interconnect structure further configured to provide external input/output access with respect to the semiconductor device; and
applying energy to said interconnect structure such that said heating caused by said applied energy causes the dielectric constant of said thermally alterable dielectric to change.

[c8] The method of claim 7, wherein said thermally alterable dielectric further comprises a porogen material.

[c9] The method of claim 8, wherein said dielectric constant is decreased when said porogen material is heated by said applied energy.

[c10] The method of claim 9, wherein said applied energy comprises at least one of: electric current and an optical beam.

[c11] The method of claim 7, wherein said interconnect structure further comprises a cage-like structure having lower and upper bus bars and a plurality of metallically filled vias connected between said upper and lower bus bars.

[c12] The method of claim 11, wherein said lower and upper bus bars comprise copper and said plurality of metallically filled vias further comprise at least one of tantalum and tungsten.

[c13] The method of claim 7, wherein said interconnect structure further comprises a solid surrounding structure having lower and upper bus bars and a plurality of metallic walls connected between said upper and lower bus bars.

[c14] An apparatus for selectively altering the dielectric constant of dielectric material within a semiconductor device, the method comprising:
an interconnect structure formed around a local region of interest, said interconnect structure further configured to provide external input/output access with respect to the semiconductor device; and

the dielectric material within a local region of interest selected to be a thermally alterable dielectric material; wherein said interconnect structure is further configured such that the application of energy thereto causes the dielectric constant of said thermally alterable dielectric to change.

[c15] The apparatus of claim 14, wherein said thermally alterable dielectric further comprises a porogen material.

[c16] The apparatus of claim 15, wherein said dielectric constant is decreased when said porogen material is heated by said applied energy.

[c17] The apparatus of claim 16, wherein said applied energy comprises at least one of: electric current and an optical beam.

[c18] The apparatus of claim 14, wherein said interconnect structure further comprises a cage-like structure having lower and upper bus bars and a plurality of metallically filled vias connected between said upper and lower bus bars.

[c19] The apparatus of claim 17, wherein said lower and upper bus bars comprise copper and said plurality of metallically filled vias further comprise at least one of tantalum and tungsten.

[c20] The apparatus of claim 14, wherein said interconnect structure further comprises a solid surrounding structure having lower and upper bus bars and a plurality of metallic walls connected between said upper and lower bus bars.